



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WESTERN SERVICE AREA

RCL REPLACEMENT PLANTS CONSTRUCTION

WESTERN SERVICE AREA

CONTRACT SPECIFICATIONS AND DRAWINGS

100% Engineering Transmittal

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PREPARED BY:

MAXIMO FLORES

APPROVED BY: _____
Wing Tom, comm. Mgr, WSA-Comm/Telecommunications

DATE _____

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SECTION 01000

GENERAL REQUIREMENTS

PART 1 GENERAL

- 1.1 Scope of Work - The work covered in these contract specifications and applicable drawings consist of furnishing all labor, tools and equipment for the RCL Replacement plants construction across the Continental Western USA. The scope of this project consists of 41 repeater or terminal sites, which are located in Oregon, Washington, Idaho, and Montana. The following items are a brief summary of the project and are provided solely for the purpose of revealing the general nature of the work involved. The contractor is responsible for accomplishing all items of work in accordance with the applicable drawings, specifications and provisions of the contract. Any sundry labor and equipment not specifically detailed or specified, but required to complete the project, shall be provided by the contractor as an integral part of the scope of work specified.

Major Items of Work:

- A. Furnish all tools and equipment necessary for the grounding upgrade to the Radio Communications Link (RCL) facilities in satisfactory conformance with the contract drawings and specifications.
- B. Demolition and disposal of excess material as necessary for the new construction items and as required by the drawings and specifications.
- C. Install grounding plates at the base of the microwave tower within one foot of the waveguide bend. Bend occurs usually at 11 feet off the ground at the tower.
- D. If the distance between the tower and the equipment building is greater than 12ft (expect 50% of the time), then install a second grounding plate at the building exterior wall. The building ground plate should be mounted just below the waveguide entrance to the facility if there are no obstructions. This is typically eight to ten feet above grade.
- E. Route 4/0 AWG bare 19-strand copper from installed grounding plates to the counterpoise. Dig a trench of the dimensions shown in drawing: NMSD-D-RCLR-E001 from the base of the tower (and building, if applicable) directly to the counterpoise and route cable at the trench bottom. (Expect 12ft of trenching per site, average)
- F. Route 4/0 AWG at tower, vertically and minimizing bends, utilizing beam clamps, butterfly hangers and cold shrink to attach 4/0 AWG cable. 4/0 AWG must be electrically insulated from the tower with cold shrink rubber tubing. Clamp cable every 3ft. If tower foundation is greater than 18" above ground level, enclose 4/0 AWG in PVC conduit at wall on foundation.

- G. Route 4/0 AWG at building wall (if applicable) by drilling one-hole straps to building wall. Enclose 4/0 AWG in PVC conduit from grounding plate to 2ft below grade at base of the building.
- H. Before cadwelding 4/0 AWG cable to the counterpoise, contractor must 1) clean the welding area with a wire brush and 2) heat up the counterpoise cable with a gas torch to evaporate all moisture, if necessary.
- I. Cadweld 4/0 AWG cable to grounding plate(s) and counterpoise cable. Use the following guidelines to cadweld:
 - 1. To cadweld 4/0 AWG to ground plates, use #90 shots and bus bar mold
 - 2. To cadweld 4/0 AWG to counterpoise (4/0 AWG), use either:
 - I. #200 shots and parallel cadweld mold
 - II. #150 shots and T mold cadweld mold
- J. Do not backfill excavations until the RE has approved the work. Compact every 12” before placing overlaying lift as indicated in section 3.6.2 under Earthwork.
- K. After the work is done at each site, there will be a Construction Acceptance Inspection (CAI). The RE and the Contractor Representative must be present during CAI. The Project Engineer and other FAA representatives may be present.
- L. Demolition and removal of excess materials

1.2 Applicable Publications: - The current Federal, Commercial and Trade Association Publications, as listed in the separate sections, form a part of this specification to the extent applicable to the work being specified. Where materials or workmanship are required by this contract to exceed the referenced code or standard, it is the contractor’s responsibility to provide materials or workmanship that exceeds the referenced code or standard. Such publications are initially listed by basic designation and subject matter title but will be referred to thereafter in the technical provisions by basic designation only. The federal agencies, Commercial, and Trade Associations referenced in these specifications are as follows.

- A. Federal Specifications – Copies of Federal Specifications are available for Global Engineering Office, 2625 Hickory Street, P.O. Box 2504, Santa Ana, CA 91707, Tel. (714) 540-9870 or (800) 854-7179.
- B. Occupational Safety and Health Administration - Information on obtaining copies of OSHA regulations may be obtained from the U.S. Department of Labor, Occupational Safety and Health Administration, 1111 Third Avenue, Suite 715,

Seattle, Washington, 98101-3213, Tel. (206) 553-5930.

- C. National Fire Protection Association (NFPA) - Copies of the National Electrical Code (NEC) and the Lighting Protection Code may be obtained for the National Fire Protection Association, 1 Battery March Park, P. O. Box 9101, Quincy, MA 02269, Tel. (800) 344-3555.
- D. National Electrical Manufacturers Associations (NEMA) - Information on obtaining copies of NEMA standards may be obtained from the National Electrical Manufacturers Association, 2101 L Street NW, Washington, DC 20037, Tel. (202) 457-8400.
- E. Underwriters' Laboratories, Inc. (UL) - Copies of UL publication may be obtained from Underwriter's Laboratories, Inc., Publications Department, 333 Pfingsten Road, Northbrook, IL 60062, Tel. (708) 272-8800.
- F. FAA Standards - Copies of FAA Standards are available from the Federal Aviation Administration, Northwest Mountain regional Office Supply Center, 1601 Lind Avenue SW., Renton, WA 98055-4056, Tel. (206) 227-2843.

1.3 Safety

- A. Contractor Safety Plan - The Safety Plan shall identify and address those federal and local requirements applicable to the required work. The Safety Plan shall also include the proposed methods for accident reporting and prevention. No construction shall begin until the Contractor's Safety Plan is completed and submitted for review and approved by the government. The safety plan shall also include training certifications and address hazard assessment planning.
- B. The contractor shall comply with all applicable Federal, State and local safety regulations, and requirements, including but not limited to Occupational Safety and Health Act (OSHA)(29 CFR 1910 and 29 CFR 1926), NFPA and EPA guidance. The contractor is responsible for ensuring safe and healthful working conditions on site for its employees, sub-contractors, suppliers, and any others who may be within the work area.

1.4 Facility Operation

- A. The FAA will occupy the sites during the entire period of construction. The facility contains critical FAA equipment. This equipment must remain in service during this project. It is imperative the contractor maintain power service and access to these facilities. No interruption in service of FAA equipment is expected for this project.
- B. Unplanned outages: Even though all construction activities are outside of the facilities, the risks of unplanned outages are always present and pose a significant risk to the FAA Air Traffic Control System and to aircraft in flight. Because of

these risks, unplanned outages must be avoided.

- C. Cooperate with the FAA to minimize conflict, and to facilitate FAA operations. The contractor shall use extreme caution when using the facility to not accidentally bump equipment, which may cause unwanted outages. Any questions about equipment operations, observed abnormalities, etc should be directed to the FAA Resident Engineer.

1.5 Protection of Existing Facilities and Utilities

A. Utilities and Cables

1. Protection of existing Utilities and Cables - The existing utility lines, utility structures and all underground cables, as may be shown on the facility drawings are approximate. Where excavation occurs in the vicinity of existing utilities or cables, the contractor shall use whatever means necessary, including a cable locator, to locate the existing utilities or cables prior to any excavation. If the utilities are located within three (3) feet of the building, the contractor shall hand excavate.
2. The contractor shall stake all utility or cable crossings, and these areas shall be hand excavated within three feet of located existing buried cables. The contractor shall immediately repair any damage done by the contractor, sub contractor or suppliers to any utilities or cable. In the event that the contractor damages any existing lines that are not shown on the drawing or the locations of which are not known to the contractor, report thereof shall be made immediately to the RE.
3. If the utility lines are encountered within the area of operations, the contractor shall notify the RE so that the necessary measures may be taken to prevent interruption of the service.

- B. Protecting Government Property - The contractor shall take all precautions necessary to protect the existing facilities, equipment, buildings, vegetation, etc., during construction. Any damage done by the contractor or any subcontractors shall be repaired or replaced by the contractor at no additional cost to the government. Repairs shall be approved by the Resident Engineer and shall match the original finish. The contractor shall provide all temporary covers, enclosures, barricades, etc., required to protect the existing facilities.

- C. Heavy Equipment - Any heavy equipment use, such as backhoes, shall be coordinated with the Resident Engineer.

1.6 Use of Facilities: - Contractor shall provide at his/her expense all necessary water, communications, and sanitary items required for the entire duration of the installation period. Power is available at the site for use by the contractor.

- 1.7 Permits - The contractor shall be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, county and Municipal laws, codes and regulations applicable to the performance of this work.
- 1.8 Cleanup and Waste Disposal – The work site shall be kept clean and orderly during the progress of this project. Waste materials and debris shall be cleaned up at the end of each workday. The contractor shall provide on-site containers for the collection of waste materials, debris and rubbish and periodically remove the aforementioned materials from the site. The contractor shall remove all excess excavation that is unsuitable for backfilling when work is completed at each site. All waste shall be disposed of off site and in compliance with local regulations. The contractor is responsible for any hazards caused by construction debris.
- 1.9 Contractor's Warranty: - The contractor shall provide a signed, written warranty that all workmanship under this contract are guaranteed against defects or incorrect installation for a period of one (1) year after completion of the work. Repair and/or replacement of any improper workmanship, and/or items not in accordance with the plans and specifications shall be at the contractor's expense.

PART 2 MATERIALS

- 2.1 Contractor Supplied Materials – All materials will be provided by the contractor except for the grounding plates. The contractor is responsible to supply all tools and equipment necessary to complete the work specified in this contract.
- 2.2 Government Furnished Materials
- 2.2.1 List of Government Furnished Materials – The government will provide the grounding plates to complete the work specified in this contract. See attachment B for more details.
- 2.2.2 Inspection of Government Furnished Materials – The contractor shall inspect the Government Furnished Materials in the presence of the Resident Engineer. Any defects that are observed shall be recorded including scratches in paint and small dents and dings. An inventory of the various items and quantity of each item shall be recorded, dated and signed by both the Contractor's Representative and the Resident Engineer. The inventory shall be done at 1) before installation at each site and 2) after installation at each site.
- 2.2.3 Care of Government Furnished Materials – The contractor is responsible for the care of all items on the inventory until they have been incorporated into the work or returned to the FAA if they are not needed to complete the work. Given the nature of the project and multiple sites to be completed across the western part of the country, the contractor is responsible for protecting the materials from weather and environment when transporting the materials from site to site. The cost of repair or replacement for damaged or broken items will deducted from the contract payment.

***** END OF SECTION *****

SECTION 01041

PROJECT COORDINATION

PART 1 GENERAL

1.1 Schedules

A. Project Schedule:

1. The life span of the contract is approximately 13 weeks. The project start will be coordinated. The Contractor must work in ONE TEAM and complete a total of approximately 41 sites. A tentative project schedule will be discussed in the preconstruction meeting. The schedule shall provide for two phases: 1) Submittals and 2) Installation. All submittals should be sent to the FAA project engineer prior to any installation work.
2. The installation schedule shall contain tentatively timelines for installation at each site, transportation, etc.
3. Contract time is 10 working days for the submittal phase; whereas the working time for the installation phase is approximately 13 weeks.

B. Hours of Work: Normal work hours shall be between 7:00 a.m. to 5:30 p.m. (30 minutes lunch included) Monday through Thursday, although overtime work may be required depending on site conditions. The contractor shall coordinate in advance all work hours with the RE; the contractor will not be allowed access to work at the site without the RE.

C. Preconstruction Conference: As soon as practicable after the contract is awarded, a preconstruction conference between representatives of the FAA and the contractor will be scheduled. Project requirements, project coordination, scope and schedule will be discussed.

1.2 Coordination

- A. All work shall be coordinated with the FAA and users/customers/government agencies which may have interest.
- B. It will be essential that all construction personnel are comfortable working in high altitude sites (up to 12,000ft). Some sites have access gates; Either the RE will be given keys to these gates or an FAA escort will be present. As a general rule, leave gate as it was found before driving away.
- C. Materials pick-up shall be coordinated with the FAA project engineer. The contractor and the RE shall then proceed to pick up the materials at the location indicated by the project engineer

1.3 Contract Administration

- A. The Resident Engineer (RE) shall be the FAA's onsite representative for all matters relating to the technical requirements of the project. Coordinate all communication through the RE.
- B. The contractor shall complete a Request for Information (RFI) form for all questions regarding this contract. The completed form shall be presented to the Resident Engineer who will coordinate with the FAA project engineer for an official FAA written response. This written response will be binding to the contract. The contractor will encounter numerous individuals with different levels of responsibilities and different levels of authority. No one, except for the FAA contracting officer, has the authority to modify this contract – either verbally or in writing.
- C. Due to the possibility of miscommunications, verbal conversations between the contractor and Resident Engineer will not obligate the government or serve to modify contract requirements.
- D. The RE is responsible for keeping a diary log of materials and workforce being expended at each site.

1.4 Inspection

- A. The Resident Engineer will inspect all work in progress up to completion and final acceptance at each site. It is the RE's responsibility to track the materials and workforce being expended in each site.
- B. The Resident Engineer will notify the contractor of any non-compliance with the contract specifications and/or drawings, and may reject workmanship accordingly.

1.5 Close Out

- A. Notify the RE when Work is considered ready for Substantial Completion. A Construction Acceptance Inspection (CAI) will then be done. The CAI shall be attended by the RE and the Contractor Representative and any appropriate sub-contractors. An FAA Project Engineer and/or the FAA Site Technician (from the local SSC) may be present as well.
- B. All requirements of the contract shall be completed and ready for inspection at the time of the CAI.
- C. Complete all punch-list items from the CAI.
- D. Final Clean up required before CAI includes removing waste and surplus materials and executing final clean-up.

- E. Provide final submittals, as applicable.
- F. Submit final Application for Payment following all CAI's and acceptance of submittals.

PART 2 MATERIALS

Not Used.

PART 3 EXECUTION

Not Used.

***** END OF SECTION *****

SECTION 01300

SUBMITTALS

PART 1 GENERAL

- 1.1 Submittal Requirements. - Submittal data required by this contract shall be submitted to the FAA project engineer for review and approval. All submittals shall be provided within 10 working days after the notice to proceed. Unless directed otherwise by the FAA project engineer, the contractor shall not proceed with any construction work until after approval of all submittals.
- 1.2 Submittal Procedure:
 - 1.2.1 Contractor Safety Plan - The Safety Plan shall identify and address those federal and local requirements applicable to the required work. The Safety Plan shall also include the proposed methods for accident reporting and prevention. No construction shall begin until the contractor's Safety Plan is completed and submitted for review and approval to the government. The safety plan shall also include training certifications and address hazard assessment planning.
 - 1.2.2 All submittals shall be accompanied by a transmittal letter which identifies the item and the data submitted, notes any substitutions or deviations from the specifications and contains the prime contractor's approval signature. Transmittal letters shall consist of one original and one copy.
 - 1.2.3 All submittals, including those from subcontractors, shall be checked and approved by the contractor and coordinated with any other work involved before they are transmitted for review. Submittals shall be complete and detailed, and assembled in sets. Lack of completeness or inadequate descriptions will be justification for disapproval.
 - 1.2.4 The FAA requires five (5) working days for reviewing and responding to each submittal. The contractor shall account for this review period during this contract.
- 1.3 Submittal Review – The FAA project engineer will stamp, check the review status, sign and date each submittal page. The contractor shall address the review status as follows:
 - 1.3.1 Approved as Submitted – If stamped and checked “No Exception Taken,” the submittal is approved. After submittals have been approved, no changes or substitution will be permitted without written approval by the FAA project engineer.
 - 1.3.2 Approved as Noted - If stamped and checked "Make Corrections Noted," the submittal is satisfactory contingent upon the contractor's acceptance of the comments and notations; no re-submittal is required. If not accepted, the contractor must resubmit.

- 1.3.3 Not Approved - If stamped and checked “Revise and Resubmit” or “Rejected,” the submittal does not meet job requirements and the contractor must resubmit. The contractor shall resubmit the corrected material in the same manner as the original.

***** END OF SECTION *****

SECTION 02070

DEMOLITION AND REMOVAL

PART 1 GENERAL

1.1 Description of Work:

- A. The extent and location of the “Demolition” work is indicated on the drawings. The work includes the requirements for the removal, wholly or in part, and satisfactory disposal of all items which are designated to be demolished on the drawings or within these specifications.
- B. The Demolition work is included on the drawings for guidance only to indicate typical general construction features of the various types of structures and is not to be construed as definitive or adequate to supplant the actual on-site inspection by the contractor.

1.2 Site Operational Plan:

- A. The contractor shall meet with the Resident Engineer, the FAA Electronic Technician and the FAA Site Technician to discuss and finalize a Site Operational Plan for a) demolition, b) construction and c) excess materials disposal.
- B. The contractor shall obtain approval to proceed from the Resident Engineer prior to each planned work area. The contractor shall then proceed with the work in that area in a prudent and efficient manner.

1.3 Job Conditions:

- A. The contractor shall examine the site, plans and specifications to become familiar with the quantity and character of all materials to be demolished. The contractor assumes full responsibility for the proper disposal of all demolition materials.
- B. Provide OSHA certified workers for all work at heights requiring climbing apparatus.
- C. Locate all underground utilities in the work area and protect those not designated for removal.

PART 2 MATERIALS

Not Used

PART 3 EXECUTION

3.1 Asbestos-Suspected Materials - If the contractor encounters or suspects the presence of asbestos containing materials (other than those identified), the contractor shall immediately stop work and notify the Resident Engineer. The Federal Aviation Administration will have the material tested for asbestos and notify the contractor of the results. The contractor shall not disturb the suspect material without written authorization from the FAA Contracting Officer.

3.2 Protection

- A. Demolition and removals shall be performed with care so as to create the least possible damage to the supporting and surrounding surfaces. Damaged surfaces shall be repaired or restored to their original condition.
- B. Perform demolition in such a manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, structures or services; and to provide free passage to and from such adjacent areas. Comply with OSHA requirements.
- C. Provide safeguards, such as cones, barricades, signs and other similar items that are required for the protection of all personnel during demolition and removal operations.
- D. Provide and maintain safeguards, such as barricades, cones, etc. around excavations until such excavations have been completely filled.
- E. Prevent the spread of flying particles and debris outside of the planned work area. Keep the work area cleaned on a daily basis.
- F. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. All workers shall be instructed in the use of fire extinguishers.

3.3 Disposal:

- A. All materials and debris resulting from the demolition shall be disposed of offsite and in accordance with General Requirements and the applicable federal, state and local codes.

***** END OF SECTION *****

SECTION 02300

EARTHWORK

PART 1 GENERAL REQUIREMENTS

1.1 Scope – The work consist of furnishing all labor, tools and equipment for the excavation, fill and backfill required for digging trenches, gravel surfacing and seeding, if applicable. It also includes the disposal of excess excavated soils and debris off-site.

1.2 Applicable Publications - The current publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM C 117 1990 Materials Finer than No. 200 (75 um) Sieve in Mineral Aggregates by Washing

ASTM C136 Sieve Analysis of Fine and Coarse Aggregates

ASTM D698 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 kg) Rammer and 12-in. (305 mm) Drop

ASTM D1140 Amount of Material in Soils Finer Than the No. 200 (75 Micrometer) Sieve

ASTM D1557 Laboratory Compaction Characteristics of Soil using Modified effort (56,000 Ft - LBS/Ft³)

ASTM D2487 Classification of Soils for Engineering Purposes

ASTM D4318 1993 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.3 Related Sections:

A. Section 02684, Conduits.

1.4 Submittals - The following shall be submitted for review and approval prior the work:

A. Dewatering Plans.

1.5 Quality Control:

A. If deemed necessary, the contractor shall obtain materials from a State DOT approved, commercial source. The contractor shall submit a copy of each supplier's DOT certification, as well as test reports for each material used. All tests shall have been performed within 6 months of the delivery date.

- B. Inspection of Excavated Area – When excavations have reached the required elevations, the contractor shall not proceed with further installation of the excavated area until the work has been inspected by the RE.
- C. At the time of delivery, if any, the contractor shall give the Resident Engineer a copy of the material delivery ticket. The delivery ticket shall contain the following information: name of supplier, date of delivery, quantity, and specification that the material meets.
- D. The contractor is responsible for controlling the quality of the material and he/she shall provide for material testing as necessary to demonstrate contract compliance. At the FAA's discretion, quality assurance tests may also be conducted by an independent commercial testing laboratory at the FAA's expense. The contractor shall cooperate with this effort and allow for this sampling and testing.

PART 2 MATERIALS

- 2.1 Fill/ Backfill Materials – All base and bedding materials shall be imported from a DOT certified and approved commercial source. Suitable, excavated material (no stones larger than 4" diameter or organic material) shall be used for backfilling underground lightning protection systems up to the top surfacing layer as shown on drawing NMSD-D-RCLR-E001. All materials shall be clean, i.e. free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. If there are not sufficient quantities of suitable, excavated materials, the contractor shall import a clean, sand/gravel material for finish backfill.
- 2.2 Surfacing Material - Surfacing material shall consist of clean, sound, durable particles of crushed stone or gravel; be manufactured from ledge rock or gravel; and contain no clay balls. Crush surfacing material shall be imported from a DOT certified and approved commercial source and comply with the DOT designated specification. Material shall be uniform in quality and free from wood, roots, bark and other extraneous material. Crushed surfacing shall meet the following requirements for grading and quality:

	WSDOT 9-03.9(3)	ODOT 02630.10
<u>Sieve Size</u>	<u>Percent Passing</u>	<u>Percent Passing</u>
2"		100
1-1/2"		95 - 100
1-1/4"	100	
1"	80 - 100	
3/4"		55 - 75
5/8"	50 - 80	
1/4"		35 - 50
No. 4	25 – 45	
No. 10		14 - 30
No. 40	3 – 18	
No. 200	7.5 max.	7.5 max.
% Fracture	75 min.	75 min.

Note:-

WSDOT is the Washington State Department of transportation.

ODOT is the Oregon Department of transportation.

These references are applicable in the State of Colorado.

All percentages are by weight.

The fracture requirement shall be at least one fractured face and will apply to material retained on each specification sieve size No. 10 and above if that sieve retains more than 5 percent of the total sample.

PART 3 EXECUTION

- 3.1 Underground Utilities – The contractor shall physically verify the location and elevation of all underground utilities in and around excavation areas prior to the work. In areas where existing utilities are suspected or actually located and where the utility is not designated for demolition, the contractor shall excavate carefully by hand to avoid damage.
- 3.2 Excavations – During the excavating operation, the contractor shall stockpile the following in separately stockpiles: 1) topsoil, 2) suitable backfill material and 3) unsuitable, excavated materials.
- 3.3 Subgrade: - Excavate to subgrade elevations necessary to provide a finished product that meets the cross sectional areas specified on the drawings and as necessary to meet final elevations. Trim bottoms of excavations to provide for a uniform solid base to receive other work. Protect subgrade from softening, undermining, washout, damage by rain or water accumulation and damage by construction activities. Reconstruct any subgrade that has been damaged. Excavate soil disturbed or weakened by contractor's operations and

soils softened or made unsuitable for subsequent construction due to exposure to weather. Repair areas and any over-excavations shall be filled with the same material as designated for the adjacent upper layer and compacted as specified.

- 3.4 Conduit Trenches - Excavate to the dimension indicated. Grade bottom of trenches to receive specified base or bedding material to provide uniform support.
- 3.5 Site Drainage & Dewatering - Excavation shall be performed so that the area of the site and the area immediate surrounding the site will be continually and effectively drained. Water shall not be allowed to accumulate in the trenches and other excavated areas. The contractor shall completely pump out water from excavated areas so that they are kept sufficiently dry at all times.
- 3.6 Filling and Backfilling - Fill and backfill with specified materials to contours, elevations, and dimensions indicated. Compact each lift before placing overlaying lift as indicated in section 3.6.2.
 - 3.6.1 Underground Lightning Protection System - Backfill with suitable, excavated materials in 12 inch maximum lifts. Compact with two passes of a rod tamper.
 - 3.6.2 General Site - Place backfill and compact in lifts of 6 inch maximum with three passes of a rod tamper.
- 3.7 Finish Operations:
 - 3.7.1 Grading - Finish grades shall be uniform and smooth and free from irregular surface changes. Comply with requirements on the drawings.
 - 3.7.2 Protection of Surfaces - Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.
 - 3.7.3 Disposition of Surplus Material - Remove and properly dispose off the site surplus or other soil material not required or suitable for filling or backfilling.

***** END OF SECTION *****

SECTION 02684

CONDUITS

PART 1 GENERAL

- 1.0 **General:** The contractor shall provide all labor, tools and equipment to install PVC conduits, fittings and straps as applicable per drawing NMSD-D-RCLR-E002.
- 1.1 **Applicable Publications:** - Latest edition of the following form a part of this specification:
- 1.1.1 American Society for Testing and Materials (ASTM).
- ASTM D 1785-93 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
- ASTM D 2466-94a Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- ASTM D 2564-93 Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- 1.1.2 Federal Specifications.
- W-C-1094 Conduit and Conduit Fittings: Plastic, Rigid
- 1.1.3 Underwriters' Laboratories, Inc.
- UL 651 Schedule 40 and 80 Rigid PVC Conduit
- 1.2 **Quality Assurance:**
- 1.2.1 **Delivery and Storage:** store materials in a manner that will prevent contamination and damage. Conduit shall be stored to avoid warping and/or deterioration with ends sufficiently plugged to prevent entry of any water and solid substances. In order to prevent surplus materials from water and/or adverse weather damage, conduit and materials shall be stored in a truck trailer or enclosed truck bed until they are installed.
- 1.2.2 **Inspection of Conduits:** Prior to installing the conduits, they shall be inspected and approved by the RE.

PART 2 EXECUTION

- 3.1 **Conduit Installation:** all conduits shall be installed and jointed in accordance with these specifications and the manufacturer's recommendations. Conduits shall be as shown on the plans – moderate sweeps and bends on PVC may be done in the field. Conduits shall be installed as shown in on drawing NMSD-D-RCLR-E002. All conduits shall be

separated from any existing, crossing utility by a minimum of 12 inches in all directions – both vertically and horizontally. Conduits shall be kept clean of all water, concrete, dirt, or foreign substances during installation. Where conduit has to be cut in the field, it shall be cut square using a proper pipe cutting tool. The cut ends of a field cut shall be reamed to remove burrs and sharp edges. Conduit must be plumb and leveled after installation.

- 3.2 PVC Conduit: All PVC conduit joints shall be properly cemented in accordance with the manufacturer's recommendations and these specifications. PVC conduits shall be stored on a flat surface and protected from direct sunlight.

***** END OF SECTION *****

SECTION 16181

CABLE INSTALLATION

PART 1 GENERAL

1.1 Description of the Work:

Install and route 4/0 AWG bare stranded copper cables from transient grounding plates on tower and building (if applicable) to the Earth Electrode System (EES). The cable shall be exothermically welded to the transient plates and to the counterpoise. Install new cable clamps and cold shrink to down conduct copper from plates to the EES. Do not slit the cold shrink. Furnish all labor and hardware for the installation of cable clamps/one-hole straps on the towers/building to hold the copper cable firmly in place as indicated on drawing: NMSD-D-RCLR-E002 and NMSD-D-RCLR-E003.

1.2 Specific Items of Work:

- A. Locate counterpoise with a cable locator and dig a trench with the dimensions shown on drawing NMSD-D-RCLR-E001. The trench shall run from the cable coming down the base of the tower to the counterpoise.
- B. If a grounding plate is required in the building, an additional trench shall be dug from the base of the building to the EES.
- C. Route bare stranded copper cable 4/0 AWG from transient grounding plates on the tower (and building, if applicable) to the counterpoise.

1.3 References:

- A. NFPA 70 - National Electrical Code.

PART 2 MATERIALS

See attachment B for a complete list of materials

PART 3 EXECUTION

3.1 Support System – Install support system on tower in accordance with the project drawings and manufacturer's instructions. Contractor shall not drill holes in a tower member.

3.2 Installation:

- A. If a cable is kinked, it shall not be installed.

- B. The contractor shall take all precautions not to damage the cable. If the contractor damages or kinks the cable before, during or after installation, he/she shall replace the cable at his/her own expense.
- C. No splices shall be permitted in cable runs. They shall be continuous.
- D. No bends shall be made during installation of less than 18 inch radius.
- E. Pull cable in such a way as to prevent harmful stretching or damage to the PVC.
- F. Cable may be pulled by hand through PVC when installing it on the building. PVC shall be heated to make soft bends if deemed necessary. Contractor shall use caution when pulling the cable through in order to not damage the PVC.

3.4 Inspection by the Contractor:

- A. Perform all inspection in the presence of the RE.

***** END OF SECTION *****

SECTION 016670

LIGHTNING PROTECTION, BONDING & GROUNDING

PART 1 GENERAL

- 1.1 General: The contractor shall provide all necessary labor and equipment as necessary to install the grounding components as specified on the drawings and in this specification. The contractor's work shall comply with all applicable sections of FAA-STD-019e, Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities. The major work items for this project are as follows:
1. Installing transient grounding plates at the tower (and building, if applicable).
 2. Routing bare strand 4/0 AWG copper from grounding plates to the EES. The 4/0AWG must be insulated from the tower.
 3. Additional grounding work may be required depending on site conditions.
- 1.2 Applicable Documents: The following specifications and standards are currently enforced, form a part of this section, and are applicable as specified herein.
- 1.2.1 National Fire Protection Association (NFPA) Publications-
- No. 70 National Electric Code
 - No. 780 Standard for the Installation of Lightning Protection Systems
- 1.2.2 Underwriters' Laboratories
- UL 96A Installation requirements for Lightning Protection Systems
- 1.2.3 Federal Aviation Administration
- FAA STD 019e Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities
 - FAA-STD-020b Transient Protection, Grounding, Bonding and Shielding Requirements for Electronic Equipment

PART 2 MATERIALS

- 2.0 Materials: All materials, except for the grounding, plates will be provided by the contractor. The contractor is responsible for their proper use and storage. The Resident Engineer (RE) will be responsible for accounting and keeping track of all materials used on site.

- 2.1 Grounding Conductors: The grounding electrode conductor shall be 4/0 AWG bare copper 19 strands.

PART 3 EXECUTION

- 3.0 Installation: The location of the grounding system for the facility shall be as indicated on the contract drawings, as specified in FAA STD 19e, as required by the applicable documents and as specified herein. In the event of conflicting requirements, the most stringent shall apply.
- 3.1 Other Hardware: Install hardware in a neat manner, parallel or perpendicular or plumb when fastened to surfaces. Prior to bonding to surfaces, all connection points shall be cleaned of paint, insulation and other non-conducting materials over an area that extends at least ¼ inch beyond the bonding surface of the larger member.
- 3.2 Underground Connections: No part of the underground cable or connections shall be concealed until the RE has inspected, tested and approved the exothermic welds, conductors and connections in that part of the system. Any faulty connections or items shall be corrected or replaced as directed by the RE.
- 3.3 Grounding Electrode Test: In the case that a new counterpoise is installed, the contractor shall measure the earth electrode grounding resistance of the installed counterpoise. Test shall be the 3-point fall-of-potential measurement of the earth electrode system resistance and in accordance with FAA Specification 1217f, 5.3.6. The contractor shall record the test results and submit the report to the RE. The contractor shall notify the RE immediately if the resistance of any test is above 10 ohms. The FAA will provide the EES test gear.

***** END OF SECTION *****

ATTACHMENT SCHEDULE

FTI RCL REPLACEMENT

WSA NWM REGION

ATTACHMENT A

PROJECT DRAWINGS

ATTACHMENT B

GOVERNMENT FURNISHED MATERIALS

ATTACHMENT C

SUBMITTALS AND REQUIREMENTS

ATTACHMENT A
FTI PROJECT
RCL REPLACEMENT PLANTS INSTALLATION

PROJECT DRAWINGS

<u>DRAWING</u>	<u>TITLE</u>	<u>DATE</u>
NMSD-D-RCLR-E001	CADWELD DETAILS	01/12/2010
NMSD-D-RCLR-E002	SHELTER AND TOWER SETUP	01/12/2010
NMSD-D-RCLR-E003	CONNECTION DETAILS	01/12/2010

REFERENCE DRAWINGS

<u>DRAWING</u>	<u>TITLE</u>	<u>DATE</u>
NMSD-D-RCLR-C001	TYPICAL RCL SITE PLAN	01/12/2010
NMD-554-85-08 (REV K)	MICROWAVE ROUTES	10/20/1987
NMSD-D-MISC-E001	STANDARD GROUDING DETAILS	02/22/2008

ATTACHMENT B

FTI PROJECT

RCL REPLACEMENT PLANTS INSTALLATION

GOVERNMENT FURNISHED MATERIALS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>COST</u>
8	Bus bars kits	90 kits	\$4500

Materials access and delivery dates shall be coordinated with the Resident Engineer. DO NOT attempt to obtain entrance to the storage area to pick up materials from the storage compound without contacting the project engineer. The contractor shall be responsible for transporting the materials from site to site, unloading and storing them at the job site for installation and loading the remaining back to the next site and so on. The contractor shall furnish all additional materials, tools and equipment necessary to complete the project.

Before acceptance of materials, the contractor and the Resident Engineer shall visually inspect the materials for omissions and defects. The contractor shall sign acceptance for the materials and be responsible for them until acceptance of the contract work. The Resident Engineer, shall record all the materials used at each site.

The above materials have been inspected, accepted and adequate storage and protection shall be maintained at all times, including on site and while transporting it from site to site.

Received By: _____ Date: _____
(Contractor Representative)

Witnessed By: _____ Date: _____
(Resident Engineer)

ATTACHMENT C
FTI PROJECT
RCL REPLACEMENT PLANTS INSTALLATION
LIST OF SUBMITTALS AND REQUIREMENTS

1. SUBMITTALS LIST

- I. CONTRACTOR SAFETY PLAN
- II. PROJECT WORK SCHEDULE
- III. PLAN OF STORING/TRANSPORTING MATERIALS

2. PRE CONSTRUCTION SAFETY AND HEALTH CHECK LIST (SEE BELOW)